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The force of dialectics

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chapter 6. The metaphysical and logical concepts.

In the years 1755-1768, Kant wrote on the metaphysical concepts and structures concerning his physics. His physical concepts as such did not change. Kant tried to explain the ontological and logical presuppositions which they require.

The central place amongst the ontological presuppositions was taken by the concept of sufficient reason (which is a more or less Leibnizian expression), that is, the ultimate ground for existence (which is a much more Kantian expression). As concerns the concepts of logic, determination and opposition ("Entgegensetzung") featured in Kant's works of this period.

In the following sections, I will review the texts which have, in my opinion, the strongest bearing on the subject in hand.

section 1. A new clarification of the first principles of metaphysics.

In 1755, the same year in which Kant published his General history of nature and theory of the heavens, he published his Principiorum primorum cognitionis metaphysicae nova dilucidatio (24) (A new clarification of the first principles of metaphysical knowledge). ANTH gives an account of the physical model of the universe, PPCMND an account of its (onto-)logical presuppositions.

Before reviewing the text, I would like to point out that the formulation of the title, which clearly states that the treatise is on principles of metaphysical knowledge, could give rise to the erroneous view that Kant is not making statements on entities of being, but only on concepts. One has to keep in mind that this treatise was written long before the Critiques, and that Kant does not yet reject the possibility of knowledge about "das Ding an sich", here.

The PPCMND deals with the question, how an accurate metaphysical system of nature should be put together. A metaphysical system of nature is a body of knowledge, which, therefore, has to be organized according to general principles of knowledge.

There is not, says Kant, a single principle which is the foundation of all knowledge. For, if there were, it would have to state a single proposition which could only be either affirmative or negative. A proposition which is only affirmative, however, cannot be the foundation of negative propositions; nor can a proposition which is only negative be the foundation of affirmative propositions (25). Since knowledge includes both negative and affirmative propositions, it must, as a consequence, have at least two single principles as its foundation (PPCMND, pp.408-411).(26)

These two principles are: **quicquid est, est** (whatever is, is), and **quicquid non est, non est** (whatever is not, is not); together they form the principle of identity

(id., p.412). But this is not enough.

The principle of identity precedes the principle of contradiction which is: **impossibile est, idem simul esse ac non esse** (it is impossible that the same is and is not at the same time) (id.,p.418). In order to be a complete foundation of truth (together with the principle of identity), this principle needs a second fundamental proposition: **cuiuscunque oppositum est falsum, illud est verum** (everything of which the opposite is false, is true) (id., p.418).

Thus, Kant claims that there are two pairs of fundamental propositions which form the two principles of all knowledge.

On this basis, it is obvious that **determinare est ponere praedicatum cum exclusione oppositi** (to determine is to posit a predicate with the exclusion of its opposite), as Kant formulates it (id. p.422). That which determines a subject with respect to its predicate, is called **ratio** (ground) (id.,p.422). Since to determine is to posit a predicate with the exclusion of its opposite, a ground can only determine by excluding the opposite of what is posited by it. The concept of sufficient reason (**rationis sufficientis**) is, therefore, more properly denominated the concept of determining ground (**rationis determinantis**) (id., p.426).

Here, in fact, Kant criticizes Leibniz (via Wolff), for the concept of sufficient reason in the Leibnizian system entails the inclusion of the sufficient reason in the subject which is determined. This inclusion is rejected by Kant. He argues:

> "Quicquid enim rationem exsistentiae alicuius rei in se
> continet, huius causa est. Pone igitur aliquid esse, quod exsistentiae suae rationem haberet in se ipso, tum sui ipsius causa est. Quoniam vero causae notio natura sit prior notione causati, et haec illa posterior: idem se ipso prius simulque posterius esset, quod est absurdum."
>
> (PPCMND, p.430)
>
> (For everything which contains the ground of the existence of a thing in itself, is its [viz. of that thing] cause. Posit, therefore, that there is a thing which has the ground of its existence in itself, then this is the cause of itself. But since the notion of a cause is, by nature, prior to the notion of what is caused, and the latter posterior to the former: the same would be at the same time prior and posterior to itself, which is absurd.)

The absurdity of a thing which is its own cause does not derive from a temporal impossibility, as the use of prior and posterior might suggest. Kant does not refer directly to his principle of contradiction, here. He refers, I think, to his concept of determination which states that a ground posits a predicate with the exclusion of its oppo-

site. Now to be both prior and posterior, in the logical sense of these terms, is an opposition. Therefore one cannot posit both of them with respect to the same predicate.

This interpretation is confirmed by the fact that Kant concludes from this:

> "Quicquid igitur absolute necessario exsistere perhibetur,
> id non propter rationem quandam exsistit, sed quia oppositum cogitabile plane non est. [...] **Exsistit**; hoc vero de eodem et dixisse et concepisse sufficit."
> (PPCMND, p.430)
>
> (Everything, therefore, which is claimed to exist absolutely necessarily, does not exist because of a ground, but because the opposite is completely unthinkable. [...] **It exists**; to have said and conceived this of it, suffices.)

It is evident that these are logical considerations; time as such does not enter the argument. Kant's argumentation is clear: That which is absolutely necessary cannot have an opposite determination as concerns its existence: it cannot but be, otherwise it would not be absolutely necessary. Since it has no opposite determination as concerns its existence, it cannot be determined in this respect at all. Therefore its existence has no ground, that is, it has no ground in the same way as things have which exist contingently.

One could object that, if the existence of a thing cannot be determined, it does not exist. But Kant would agree with this; he would only add: it does not exist in a determinate way. For the only thing the existence of which is absolutely necessary, is the thing the existence of which logically (and ontologically also, for one is discussing existence, here) precedes the existence of everything else. This thing is God, says Kant:

> "Datur ens, cuius exsistentia praevertit ipsam et ipsius
> et omnium rerum possibilitatem, quod ideo absolute necessario exsistere dicitur. Vocatur Deus."
> (PPCMND, p.432)
>
> (A being is given, of which the existence itself precedes its own possibility and [the possibility of] all other things, which, therefore, can be said to exist absolutely necessarily. It is called God.)

In order to conceive of existing things, one must be able to conceive of their possibility. But possibility, argues Kant, is a relation, viz. the relation between things of which the existences do not contradict each other. To conceive of the possibility of the existing things, therefore, is to conceive of all these things. They must be present in the concept of that which makes them possible. This concept cannot be their own concepts, since in that

case they would contain their own ground, which they do not. Furthermore, if each thing contained its own possibility, its possibility would be determined, therefore limited, and, as a consequence, the concept of absolutely necessary existence, which has to precede the concept of actual existence (which is contingent), could not be formed. It follows, then, that the possibility of all existing things must be contained in one concept which is infinite (therefore undetermined). This one and infinite concept, which is distinguished from all other concepts, is the concept of God (PPCMND, pp.432-434).

Kant is using terms meticulously, here. He never refers to God as the **ratio** (ground) (27) of the existing things, but uses terms as **principium** (principle), **fons** (source), etc. For a ground has to have an opposite, but the first ground cannot have an opposite, cannot, therefore, be a proper ground. God contains all grounds, but that is a different matter.

Furthermore, Kant points out that all possible existing things are realities (**realia**) in God (PPCMND, p.434). For, if they were not really in God, they could not be related, hence they could not be possible (as has been pointed out above). Of these realities in God, Kant remarks that they are **possibilium omnium conceptuum velut materiale** (the material of all
possible concepts, so to speak) (id., p.434).

The actualy existing things, of course, can be determined, and consequentially they must have a ground:

> "Nihil contingenter exsistens potest carere ratione existentiam antecedenter determinante."
> (PPCMND, p.436)
>
> (Nothing which exists contingently can lack a ground which determines antecedently the existence.)

Kant’s reasoning as concerns contingent entities is very simple. If contingent things do not have a ground, then they either exist absolutely necessarily, or not at all. But they exist. And they are contingent. Therefore they do have a ground (PPCMND, pp.436-438)

From this, Kant draws the corollary that the principle of sufficient reason applies only to contingent entities (id., p.438). In this, he differs from Leibniz.

He also concludes that nothing is in what is grounded which
was not before in the ground; that things which have nothing in common cannot be each other’s ground; that in what is grounded cannot be more than in the ground; and that the **quantitas realitatis absolutae** (quantity of absolute reality) in the world cannot increase or decrease in a natural way (id., pp.474-476).

Subsequently, Kant proceeds to expound the concepts concerned with substances. Apparently, Kant thinks of contingent entities as substances; he does not define substance, but from the context this much is clear.

Substances, says Kant, can only suffer change inasfar as they are connected with other substances (PPCMND, p.488). This, of course, is only a different formulation of one of the conclusions above, viz. that things which have nothing in common cannot be each other's ground (which means that they cannot determine each other). It is clear, therefore, Kant continues, that their reciprocal dependency determines their mutual change (id.,p.488).

This means that a completely unconnected substance is completely unchangeable. And it means also that, if a connection does not change, the internal states of the connected entities do not change either. Motion is the phenomenon of changing connection. Therefore, if there is no motion, there is no inner change, and, as a consequence, no order (28) (id., p.488).

This implies that, if entities are connected and these connections change, that is, if there is a change of motion, there must also be a change in the internal states of the entities.

At this point, Kant again attacks Wolff and, through him, Leibniz. Wolffian metaphysics, says Kant, claims that change is ultimately grounded in the inner force of substances, that is, the ground of change is the inner activity of the changing substance itself. Kant, of course, rejects this. He has to, for he has already established that no contingent entity (that is, a substance) can have its ground in itself. But, as one will remember, in ANTH Kant claims that the motion of matter is caused by attraction, that is, gravitation, and repulsion. Is this an inconsistency? Certainly not, for Kant also says in ANTH that those forces are essentially relations between parts of matter. And here, he says that, if one wants to know what is the origin of change, one should consider the connection of the contingent things and what flows from it (PPCMND, p.492).

Substances, Kant continues, are not connected by their existence, but, ultimately, by God:

> "Substantiae finitae per solam ipsarum existentiam nullis
> se relationibus respiciunt, nulloque plane commercio continentur, nisi quatenus a communi exsistentiae suae principio, divino nempe intellectu, mutuis respectibus conformatae sustinentur."
> (PPCMND, p.496)
>
> (Finite substances do not take their relations to each other into account solely by their existence, and they do not have any exchange at all, except inasfar as they are held in mutually respective conformity by their common principle of existence, viz. by the divine intellect.)

To exist does not mean to be related to something, according to Kant. And he explains:

> "Quoniam vero relatio est determinatio respectiva, h.e.
> in ente absoluto spectato haud intelligibilis, haec pariter ac ratio eius determinans per exsistentiam substantiae in se positam intelligi nequit."
> (PPCMND, p.496)
>
> (Since, in fact, a relation is a respective determination, that is, not intelligible in an entity which is considered in an absolute way [i.e. an entity in itself, apart from others], it, and its determining ground likewise, cannot be understood by the existence of a substance which [viz. the existence] is posited in [the substance] itself.)

Obviously, Kant holds that existence is a quality (29) of single entities as such. As a consequence, relation is not included in the concept of existence. As a further consequence, determination by another existing entity is also excluded from the concept of existence, which means that the concept of ground is excluded too.

Ontologically, this means that the universe is not **per se** a unity, but in God. Kant states that the universal relatedness and interaction of all things (**universale rerum omnium commercium**) can only be ascribed to the concept of God's idea of the universe (PPCMND, p.498).

It means also that the existence of entities does not entail place (**locus**), space (**spatium**), or situation (**situs**), since these are relations (id., p.500). A substance, therefore, can exist without being spatially located, and without having relations, according to Kant (PPCMND, p.502). It is also possible that worlds exist which are completely separated from our world (id., p.502).

Space, says Kant, is established by the interactions of substances, since this is the way they are related to each other and determine each other. Space is the action and reaction of the substances. This interaction is expressed in motion, since motion is the external phenomenon of determination, and inasfar as all substances move towards each other it is clear that this interaction is called attraction, that is, gravity. Gravity works over every possible distance, since its only presupposition is the **compraesantia** (being present at the same time) of the substances involved. Furthermore, since gravity is established by the same relations which establish space, it is the primary (**maxime primitivam**) law of nature to which matter is bound (id., p.504).

This dynamical concept of space is interesting but problematical. Kant has as yet not introduced a substance which is the substrate of relatedness. Clearly no ordinary substance can be this substrate, for it is possible to be a complete substance and yet not be related to anything, as has been pointed out above. But the universe does not contain anything else except ordinary substances and their relations. Kant's solution to this problem is that all substances are related in the same space, but not substan-

tially so. No substance can determine any other substance by its inner state or properties, but only by connection (as has been pointed out above), and this connection exists, strictly speaking, only in God's intellect; therefore, Kant concludes, in this world connection is only external, there is no **influxus physicus** (PPCMND, p.504).

The solution seems similar to Leibniz's idea of a pre-established harmony, but Kant points out that there is an essential difference between his concept of harmony and Leibniz's:

> "Neque tamen **praestabilita** illa **Leibniziana**, quae proprie **consensum**, non **dependentiam** mutuam substantiis inducit, [...] sed est realis substantiarum in se invicem facta actio, s. commercium per causas vere efficientes, quoniam idem, quod exsistentiam rerum stabilit, principium ipsas huic legi alligatas exhibet, hinc per eas, quae exsistentiae suae origini adhaerent, determinationes mutuum commercium sit stabilitum; [...]."
>
> (PPCMND, pp.504-506)
>
> (Yet it is not the Leibnizian pre-established harmony, which is, properly speaking, a consensus, not mutual dependency of substances, which is introduced, [...] but there is real action of substances upon each other, that is, interaction by truly efficient causes, since the same principle that establishes the existence of things also binds them to this law [i.e. the primary law of nature which is mutual interaction and which is expressed in attraction], hence the mutual interaction will be established by those determinations which are related with their origin.)

The question arises, of course, in what way God effectuates the unity of the universe, how He establishes relatedness. Kant has also an answer to this question:

> "Schema intellectus divini, exsistentiarum origo, est actus perdurabilis (conservationem appellant), in quo si substantiae quaevis solitario et absque determinationum relatione a Deo conceptae sunt, nullus inter eas nexus nullusque respectus mutuus oritur; si vero in ipsius intelligentia respective concipiantur, huic ideae in continuatione exsistentiae conformiter postea determinationes semet semper respiciunt, h.e. agunt reaguntque, statusque quidam singularum externus est, qui, si ab hoc principio discesseris, per solam ipsarum exsistentiam nullus esse posset."
>
> (PPCMND, p.500)
>
> (The scheme of the divine intellect, the origin of the existing things, is an everlasting act (called conservation), in which, if any substances whatever are conceived by God as solitary and without determining relations, no connection at all will originate between them, nor mutual respectivity; but if they

> are conceived in His intellect with respect to each other, then, in conformity with this idea, afterwards in the continuing existences, the determinations themselves
> always take each other into account, that is, they act and react, and there is an external state of the single thing which, if one would deviate from this principle [viz. that real things exist in conformity with God's idea of them], could never exist solely by virtue of its existence.)

By relating the substances in His idea of the world, God establishes that the actually existing things take each other into account. But, unlike Leibniz, Kant holds that this taking into account is an entirely external state of the existing things. Clearly, their internal state only refers to the single existence of substances.

Kant points out that God's establishing of relatedness is a continuous activity. This is also contrary to Leibniz's views.

The continuous activity is called conservation, which obviously refers to the laws of preservation of motion.

section 2. The monadology.

In 1756 Kant published a treatise with the title Metaphysicae cum geometriae iunctae usus in philosophia naturali, cuius specimen I. continet monadologiam physicam (On the use of metaphysics inasfar as it is linked with geometry in natural philosophy, of which the first specimen contains a physical monadology) (30).

The title is significant. Why would metaphysics, in natural philosophy, be linked with geometry? Because, of course, space plays such an important role in Kant's ontology. But space is established by the relations between substances, that is, the external states of the substances, and is phenomenal. This, indeed, makes a system of singular substances (as Kant's system is) a monadology which is physical rather than metaphysical (31).

One of the remarkable features of the PPCMND is the absence of repulsion, since in ANTH repulsion plays a basic role. In MPh, both repulsion and attraction are present. In his introduction, Kant says:

> "[...] cum principium omnium internarum actionum s. vim
> elementorum insitam motricem esse necesse sit, et extrinsecus quidem applicatam, quoniam illa praesens est externis, nec aliam ad movenda compraesentia vim concipere possimus, nisi quae illa vel repellere vel trahere conatur, neque porro posita sola vi repellente, elementorum ad componenda corpora colligatio, sed dissipatio potius, sola autem attrahente colligatio quidem, non vero extensio definita ac spatium intelligi queat, in antecessum iam quodammodo intelligi

> posse, qui bina haec principia ex ipsa elementorum natura et primitivis affectionibus deducere valet, eum ad explanandam interiorem corporum naturam non contemnende momenti operam contulisse."
> (MPh, pp.518-520)
>
> ([...] since the principle of all internal action or the inherent force of elements must be [a] motive [force], and [must be] applied extrinsically, because it is present to what is external, and [since] we cannot conceive of a force to move what is present at the same time other than [a force which] strives to repel or to attract, and that, further, if one posits only a repulsive force, one cannot understand the connection of elements to compose bodies, but rather the dispersion, if, however, one posits only an attractive force, one can understand the connection, but not the determined extension and space [i.e. the extension and space which are presupposed in dispersion], one can in some way understand already beforehand that he who knows to deduce these two principles from the nature of the elements itself and from their primary attributes, has contributed not a small thing to explain the internal nature of bodies.)

It is clear that Kant thinks that his contribution to the explanation of the internal nature of bodies is new and significant, because of the fact that it involves both attraction and repulsion which he deduces from the nature of the substances (here called elements) and their attributes.
It is indeed new and significant. It is new, because Kant attacks the Wolffian system of nature, which was in his day a dominant system in German natural philosophy. The ontological structures which Kant expounds in MPh form an alternative to the monadology of Leibniz/Wolff.
One should observe that Kant proposes to deal with the internal state of bodies. This is a subject which he more or less steered clear of in PPCMND. MPh can, therefore, be considered as a necessary addition to PPCMND. It is also an addition since it deals with repulsion, a force which had remained somewhat obscure until the publication of this treatise.

Kant begins by defining the concept of simple substance (which, in a footnote, he states to be identical with monad, or element of matter, or primitive parts of a body (MPh, p.522)):

> "Substantia simplex, monas dicta, est, quae non constat
> pluritate partium, quarum una absque aliis separatim exsistere potest."
> (MPh, p.522)
>
> (A simple substance, called monad, is that which does not consist of a multitude of parts, of which [parts] one can exist separately without the others.)

A simple substance, says Kant, may be composed of a multitude of parts, but these parts cannot exist separately, that is, they can only consist together and in the substance. Or, to rephrase this, a simple substance is an indivisible entity.
Bodies, however, are not. They are composed of simple substances, which can exist separately. But bodies are not infinitely divisible, since the simple substances they consist of are their smallest and indivisible parts (MPh, p.522).

Therefore, bodies consist of a finite number of monads or simple substances (id., p.530).

Space, however, is infinitely divisible, says Kant. It does not consist of monads, therefore, but monads and bodies fill it up (**implent**) (id., p.524).

The strict distinction between internal and external state
appears here once more. Monads or simple substances refer to the internal state of a body. Space does not:

> "[...] spatium, quod est substantialitatis plane expers
> et relationis externae unitarum monadum phaenomenon, [...]."
> (MPh, p.530)
>
> ([...] space, which is completely exempt of substantiality and which is a phenomenon of the external relations of united monads, [...].)

Kant maintains, obviously, the concept of space which he introduced in the preceding texts. He also maintains, therefore, the strict difference between internal and external. The difference is made even clearer and sharper by determining the internal state in greater detail.

A monad, Kant continues, is not only in space, but also fills it up (**non solum est in spatio, sed et implet spatium**) without, however, losing its simplicity (MPh, p.530-532). The fact that it does not lose its simplicity stresses the difference between internal and external; a monad may fill up space, but it is as such (that is, for itself) separated from it. As Kant explains, the differentiation of space as such does not result in the existence of parts of space, since parts of space do not have existence for themselves (id., p.532). As one will remember, according to Kant existence as such does not include spatial location. He remarks, further, that geometry does play a role in metaphysics (as appears from the divisibility of space, which is geometrical matter), but that this does not result in mixing up metaphysical concepts (as substance) with geometrical concepts (as space, line, point, etc.) (id., p.534). Accordingly, a monad does not determine the little space which it occupies when it is present (**spatiolum praesentiae suae**; this refers to the external relations of a monad, as it is only present with respect to other substances) by the plurality of its substantial parts, but by its sphere of activity (**sphaera activitatis**) (MPh, p.534). Activity refers to force, and force refers

to relatedness, that is, to the external state of the monad (32). This activity keeps off (**arcet**) the approaching substances which surround it (id.,p.534). It is, therefore, repulsive activity. It is also impenetrability (id.,p.540). In this way, a monad occupies a certain quantum of space by keeping other monads out of it; its repulsive force establishes its spatial location.

One should observe that Kant is very consistent in this. Spatial location is an external state. It is, therefore, open to determination, and determination means to posit a predicate with the exclusion of its opposite, that is, to posit one thing and to negate what it is not (see the preceding section). The positive and negative activity are spatial location (occupying space) and impenetrability, that is, repulsion respectively.

Having explained the concept of a monad, that is, simple substance as such, Kant proceeds to explain how they composite bodies.

In passing, he makes a very significant statement about God and the internal state of a monad:

> "[...] Deus, qui omnibus rebus immediate, sed intime praesens est, [...]."
> (MPh, p.544)
>
> ([...] God, who is present to all things immediately, but internally, [...].)

In the preceding section, I pointed out that, with Kant, the inner state of a substance, only referring to existence as such, seems to include existence in its singular and in its universal form, that is, existence of a single substance and existence of God. The passage quoted above lends more credibility to this surmise.

A body occupies a determined part of space, says Kant. Monads do likewise, by virtue of the force of repulsion which establishes their impenetrability. But a monad is essentially a simple substance. The force of repulsion inherent in it cannot make its constitutive parts to move away from each other, therefore. In a body, however, this is entirely possible; the amount of space it occupies might, as a consequence, be not determined at all. In a body, therefore, the force of repulsion must be accompanied by a complementary force, viz. attraction, which keeps the monads of a body together (33) (MPh, pp.548-550).

Kant adds to this two other forces: inertia and elasticity. The latter could, inasfar as it inheres in a body, simply be explained by the interaction of the repulsive and attractive force, but Kant insists that elasticity be a property of monads as such. For, he says, a monad may have an internal repulsive force which keeps off other elements, but this force is limited and could be confronted with a force which is greater. The monad cannot be divided into parts by such a greater force, for it is simple. Therefore, it must possess an internal force which is able to overcome any force whatever. This is, in fact,

a kind of repulsive force; for, as Kant states, every force increases with decreasing distance, therefore, when the monad is dented by an external force, its internal repulsive force increases and will eventually overcome the external force (MPh, p.560).

Kant makes use of two suppressed premisses, here, viz. first that all external force is spent in its activity, that is, it disappears inasfar as it succeeds in denting a monad. Otherwise it would be impossible for the internal force to overcome it; the dent would remain, since the external and internal force would simply neutralize each other at a certain point, establishing an equilibrium. The second suppressed premiss is, therefore, that internal force is not spent while active, but that it renews itself. Kant made this already clear as concerns living force and dead force (which would be internal and external force respectively) in WSdLK (see chapter 1, section 1), but he does not refer to these concepts here, and one may doubt that these concepts still play a role in his system of nature after WSdLK.

A problem is, however, that the internal repulsive force (i.e. elasticity) apparently cannot, in Kant's system, be an internal force, for it involves obviously a relation with another monad. One has, of course, to keep in mind that Kant speaks of monads as such, here; the external relation is, strictly speaking, preceded by the elasticity, for a monad must be completely elastic before it can be indivisible and, therefore, withstand every external force. Still, as soon as monads collide, the internal elasticity would have to be transformed into external repulsion; the basic problem, which is the forbidden identity or connection of internal and external state, remains. It would only vanish, if the internal elasticity would have nothing to do with external repulsion of a colliding monad.

The other force which Kant adds is inertia. Bodies would not be able to engage in interaction with other bodies by collision, if they did not possess inertia, that is, the force to preserve a present state of motion, says Kant, for they must be able to obstruct action, that is, to react, in order to engage in interaction. This inertia of a body is, however, the sum of the inertial forces inherent in its constitutive monads.

The same problem arises here as with elasticity. For inertia may precede actual interaction, as soon as a monad engages in interaction its inertia must be expressed, and, with this, a connection between internal and external state is established which is forbidden.

Monads must exist in different kinds, possessing different degrees of inertia. Kant explains this by demonstrating that the opposite leads to absurd consequences. If one assumes that all monads are equally endowed with inertia, that is, have the same mass, then one must also assume that the less heavy bodies are more rarefied than heavier bodies. This would mean that heavy bodies could easily penetrate light bodies, not, however, the reverse; but it is certain that extremely light bodies such as the particles of fire, or of magnetic or electrical liquids,

etc. do penetrate heavy bodies. If one were to try to explain light bodies, furthermore, by assuming that they contain little bubbles (**bullulae**) or are internally related by little fibres (**fibrillae**), thus occupying much more space than their quantity of matter would allow, one would have to take into account that these fibres and bubbles would have disappeared already as a result of the constantly occurring collisions which would grind them into little fragments which would fill up the empty space, thus rendering the universe completely filled with matter and, as a consequence, making all motion impossible (MPh, pp.556-558).

section 3. The only possible ground of proof to demonstrate God's existence.

In Der einzig mögliche Beweisgrund zu einer Demonstration des Daseyns Gottes (1763) (34), Kant finally expounds in full detail his concept of the unity of the universe. The exposition of the series of concepts in this treatise is very sophisticated, and the treatise offers the most complete and elaborate exposition of Kant's system of thought of the pre-critical period.

In the first part of the treatise, Kant deals with the concepts of possibility and existence ("Dasein") in order to prove that there is a necessarily existing being.

Kant begins with making the statement:

> "Das Dasein ist gar kein Prädikat oder Determination von
> irgend einem Dinge."
> (BDDG, p.630/A4)
>
> (Existence is not a predicate or determination at all of any thing whatever.)

He explains this statement by pointing out that any possible thing whatever may have every possible predicate or determination, and in this sense be complete, yet either exist or not exist. A possible thing does not necessarily exist because it is possible; but it must have all its possible determinations. Obviously, Kant concludes, existence cannot add another determination or predicate to this. Therefore, existence is not a predicate or a determination itself (BDDG, pp.630-631/A4-6).

Existence, rather, is the absolute position ("absolute Position") of a thing. It is, therefore, distinguished from predicates or determinations, which are always posited of a thing with respect to another thing (id., p.632/A8).

Position ("Position", "Setzung") is fully identical with being as such, says Kant. It has two forms. One form is to posit a thing with respect to something else; this is called **respectus logicus**, and it is, as a concept, the **copula** ("Verbindungsbegriff") in a proposition ("Urteil") (35). The other form is that in which a thing is conside-

red as such, in itself (36) (BDDG, p.632/A8).

This means, Kant continues, that in the possibility of a thing nothing more is posited than in the existence of a thing, inasfar as the ‘what’ of this thing is concerned. As concerns the ‘how’, however, the existence of a thing posits more than its possibility does, viz. its absolute position (BDDG, pp.634-635/A12-13).

In short, Kant states that the existence of things is absolute, but that their possibility is relative (that is, respective); the concept of an existing thing, however, does not differ from the concept of a possible thing inasfar as their predicates are concerned.

Kant subsequently considers the concepts of possible things.
Considering the inner possibility of things (inasfar as it presupposes the existence of these things), Kant says the following.

In the concept of a possible thing, it is the relatedness between the predicates which is essential (for, as Kant has already pointed out, this is what is making the difference with the concept of an existing thing). Everything which contradicts itself, is internally impossible. This, says Kant, refers to the logical contradiction or logical repulsion ("Repugnanz"). Or, to be more precise, it refers to the logical relation between predicates attributed to a subject; it refers, in other words, to the formal aspect of concepts. Not to the material aspect, which is the constitutive elements (i.e. predicates) as such of concepts. The formal aspect refers to what is logical in a possible thing, the material aspect refers to what is real in a possible thing.

In other words, the possibility of a concept has a logical or formal aspect on account of the relations between its predicates, and it has a material aspect on account of its predicates as such.

The inner possibility of all things, therefore, presupposes existence. For, explains Kant, possibility is not only based on what is formal, but also on what is material. Or, in other words, for a thing to be possible, it is not enough that it does not contradict itself, there must also be something which could contradict itself (but does not).

It is, clearly, impossible that nothing exists. For, says Kant, this would mean that there were no predicates, no material, hence no relations between them, and hence no possibility.

This means that, if there is possibility, it must presuppose existence in something else.

Therefore, possibility must be posited in a real thing, either as a determination of that thing, or as a consequence of another thing. That is, says Kant, a thing is possible because it is itself real, or it is possible because of the reality of another thing. If the latter is the case, Kant proposes to call this other real thing which causes the possibility of a thing, the real ground ("Real-Grund") of this possibility. The formal, that is, logical, ground of this possibility is the absence of

logical contradiction (MDDB, pp.637-641/A17-25).

Kant has now, via possibility, arrived at existence.

Considering existence as such, that is, absolute existence, he asserts the following.

If it is impossible that nothing exists (as has been established), it follows that some existence must be absolute. What exists absolutely cannot be negated, for its opposite is impossible. Existence is not a predicate; therefore, in order to negate an existing thing, it must be negated entirely, including everything it posits. But to negate absolute existence would mean to negate every existence and hence all possibility, which is impossible (see above). Therefore, an absolutely necessary being exists.

This, says Kant, introduces two kinds of contingency. Logical contingency: a contingent predicate is a predicate which does not contradict its subject (i.e. the other predicates of the subject). Logical contingency only applies to the absolute existence of which the possibility cannot be negated. Real contingency, however, does not: a thing is really contingent, if its negation does not imply the negation of everything else.

What is really contingent is, therefore, what is not absolutely necessarily existing, that is, what is not necessary to make the existence of anything at all possible.

The absolutely necessarily existing being is a single being, for it must be the ultimate ground of reality (i.e. ultimate real ground, ultimate "Real-Grund"). If it would be more than one being, it would have another ultimate ground. And for the same reason it must be simple, not consisting of parts (which would have to have another real ground).

It also includes its own possibility (it is possible, because it exists, and because it exists absolutely, it is absolutely possible) and as such it cannot change (because it is everything it can possibly be). Its reality, therefore, derives from itself and, as a consequence, it contains its own real ground. It contains, however, also the ultimate real ground of everything else (according to the concept of real ground, see above), since its existence makes everything else possible. This entails that it contains the highest reality, or, as Kant says, it contains the **data** (i.e. the material) from which flow all possible composites of predicates. It cannot, however, contain all predicates, since it cannot contain logically contradictory predicates (which would result in a logical contradiction and make the concept of this being impossible). Kant distinguishes between formal (or logical) and real contradictions; the formal contradiction has been defined above; the real contradiction ("Realrepugnanz") is defined as occurring when a real ground negates the consequence of another real ground (which is a real opposition, viz. of grounds). An example: two forces acting upon one body, each force as such resulting in motion, but together resulting in rest. If such predicates, which belong to real things, forming real oppositions instead of logical

contradictions, would be included in the absolutely necessarily existing being, they would form a logical contradiction, being then included in one subject.

Kant denominates this ultimate ground of reality God (BDDG, pp.637-654/A17-49) (37).

In the second part of this treatise, Kant applies his concept of God to the real world, showing thereby that it is not only a product of pure reason, but also supported by experience. Experience teaches that there is a unity in the essence ("Wesen") of things, which indicates the existence of God.

Space, for instance, has properties which clearly indicate this unity, Kant says. A circle is the solution to many geometrical problems which are all different from each other; this is one example which indicates that different spatial phenomena share the same essence (BDDG, pp.655-658/A50-56).

The same is indicated by the laws of motion. We need air to breathe; the atmospheric pressure of the air makes it possible for mothers to give their babies the breast; it also causes evaporation, rain, and the growth of plants; it establishes a pattern of winds, a certain climate to life in; etc., etc. In short: the laws of motion which determine the activity of air bring about a multitude of different phenomena which all form one harmonious system. Indeed, matter in general being possible, Kant says, all laws of motion flow with necessity from it which establish a perfect totality by being united in one or highest principle, although they are contingently active, that is, dependent on the single parts of matter (BDDG, pp.658-663/A56-66).

Kant distinguishes between what is moral, viz. that which depends on God’s will, and what is immoral, viz. that which does not. The possibility of things is immoral, since God cannot help it: his existence is absolutely necessary, and this existence, establishing the possibility of all things, precedes God’s will. The existence of things, however, is moral, because this does not precede God’s will. The atmosphere, for instance, is moral inasfar as its existence is concerned, but the relations and the harmony which follow from its existence are not moral, because God’s knowledge of it establishes (in him) the existence of these relations and this harmony, and his knowledge must precede his will. Being not moral, it would appear that they are absolutely necessary; which they are indeed, says Kant, but this necessity is mediated by the actual existence of things. The contingency of single relations ultimately vanishes in the total harmony: the existence of things has to be willed by God and it is, therefore, contingent, but God does not will the total harmony, he establishes it by his own existence and knowledge. Total harmony is, therefore, not a product of divine wisdom, but simply a result of God’s existence (38) (BDDG, pp.663-667/A66-73).

This means that the laws of nature and, therefore, the primary forces of nature, are not moral. As a consequence:

> "Es stehet etwas unter der Ordnung der Natur, in so fern sein Dasein oder seine Veränderung in den Kräften der Natur zureichend gegründet ist. Hiezu wird erfordert, erstlich: dasz die Kraft der Natur davon die wirkende Ursache sei; zweitens, dasz die Art, wie sie auf die Hervorbringung dieser Wirkung gerichtet ist, selbst in einer Regel der natürlichen Wirkungsgesetze hinreichend gegründet sei."
>
> (BDDG, p.667/A73-74)
>
> (A thing is part of the order of nature inasfar as its existence or its change is sufficiently grounded in the forces of nature. This requires, firstly: that the force of nature is the efficient cause; secondly, that the way in which it [viz. the force of nature] actualises its activity of causation is itself sufficiently grounded in a rule of the natural laws of activity.)

Things and forces of this kind are not moral, that is, they are not as such chosen or willed by God, but a necessary consequence of God's existence. They are not, however, as such necessary themselves. Their possibility is necessary, since God's existence makes the existence of all other things possible (BDDG, pp.670-671/A79-81).

Some things are, Kant says, in this respect mesmerizing. Many things in organic nature seem to have no common ground (contrary to all inorganic things, which do) and the laws by which we try to order them are, therefore, rather artificial. Kant wants to leave open the possibility of morality in this realm of nature (BDDG, pp.671-672/A 80-83).

As concerns inorganic nature, however, Kant is convinced of its immorality. He even rejects the necessity of the smallest of miracles in the most intricate forms of harmonious relationship; the dependency of all things on God suffices to establish harmony:

> "Die Dinge der Natur tragen so gar in den notwendigsten Bestimmungen ihrer innern Möglichkeit das Merkmal der Abhängigkeit von demjenigen Wesen an sich, in welchem alles mit den Eigenschaften der Weisheit und Güte zusammenstimmt. [...] Es wird nicht nötig sein, dasz daselbst, wo die Natur nach notwendigen Gesetzen wirket, unmittelbare göttliche Ausbesserungen dazwischen kommen, weil, in so ferne die Folgen nach der Ordnung der Natur notwendig sein, nimmermehr selbst nach den allgemeinsten Gesetzen sich was Gott Miszgefälliges eräugnen kann. [...] Und so müssen alle die Veränderungen der Welt, die mechanisch, mithin aus den Bewegungsgesetzen notwendig sein, jederzeit darum gut sein, weil sie natürlicher weise notwendig sind, und es ist zu erwarten, dasz die Folge unverbesserlich sein werde, so bald sie nach der Ordnung der Natur unausbleiblich ist."
>
> (BDDG, pp.674-675/A86-88)

> (The things of nature bear even in the most necessary determinations of their inner possibility the characteristic of dependency on that being in which everything concurs with the properties of wisdom and goodness. [...] It will not be necessary that, where nature is active according to necessary laws, immediate divine amendments intervene, because, inasfar as the consequences are necessary according to the order of nature, nothing can ever occur even according to the most general laws which would displease God. [...] And thus all changes of the world which are mechanical, therefore flow with necessity from the laws of motion, must be always good, since they are necessary according to nature, and it is to be expected that the consequence will be unamendable as soon as it has to appear according to the order of nature.)

The harmony of the real world, which is established, ultimately, by the harmony of things in God's idea of the world, cannot be imperfect, since God, in whom it is, is perfect. Kant, in a footnote, critizes Newton, who had proposed the necessity of a miracle to re-establish the motion of the solar system after it has come to rest (39). If, says Kant, the extinction of motion is a natural phenomenon, following from natural laws, it is necessary and, as a consequence, good instead of needing amendment. It will probably be compensated for in another region of the universe, so nothing will be lost (40) (BDDG, p.676/A88-89).

Even in human conduct, where free will must reign, one finds regularity if one takes large enough numbers, says Kant, which means that even here there is little or no need for miracles (BDDG, p.676/A90-91).

All in all, Kant does not absolutely exclude the incidental occurrence of miracles, but he shows an inclination to do so. He follows the rule that one should try to explain as many effects as possible by a single common cause (BDDG, p.678/A94-95). One should, therefore, infer from the natural law and order the existence of a single creator, an ultimate ground of existence and possibility (id., pp.690-691/A117-119). But, although the order of nature may originate in the divine order in God, the existence of all ordered things does not necessarily originate in this same ground; the possibility of this ordered existence, however, does (id., pp.692-693/A120-122).

In the seventh chapter of the second part of this treatise, Kant expounds his cosmology rather in the same way as he did in ANTH, only much more succinctly. I will not, therefore, review it here. I will only draw attention to the fact that Kant remarks:

> "Die Kraft dadurch sie [i.e. Himmelskörper] gezogen werden
> ist allem Ansehen nach eine der Materie eigene Grundkraft, darf also und kann nicht erklärt werden."

(BDDG, p.708/A151)

(The force by which they [i.e. the heavenly bodies] are attracted is to all appearances a fundamental force proper to matter, should not, therefore, and cannot be explained.)

Things which are open to explanation are motion and characteristics of motion (id., loc.cit.).

The second part of the treatise ends with the subject of God's complete sufficiency:

"Gott ist allgenügsam. Was da ist, es sei möglich oder wirklich, das ist nur etwas, in so ferne es durch ihn gegeben ist."
(BDDG, p.724/A180)

(God is completely sufficient. What exists, it may be possible or real, is only something inasfar as it is given by him.)

God, as has been pointed out before, can only will existence, not harmony. Harmony, therefore, must precede existence, which it does in the possibility of the things which come into existence:

"Fruchtbarkeit eines einzigen Grundes an viel Folgen, Zusammenstimmung und Schicklichkeit der Naturen, nach allgemeinen Gesetzen ohne öftern Widerstreit in einem regelmäszigen Plane zusammen zu passen, müssen zuvörderst in den Möglichkeiten der Dinge angetroffen werden, und nur alsdenn kann Weisheit tätig sein, sie zu wählen."
(BDDG, p.724/A181)

(The fertility of a single ground to bring forth many consequences, correspondence and compatibility of natures, being fit together without frequent conflict in a regular plan according to general laws, must be found beforehand in the possibilities of the things, and only after that can wisdom be active and choose them.)

But how God contains the ground of the inner possibility of all things, we cannot imagine (BDDG, p.726/A184).

As the third and last part of the treatise does not contain anything of interest for the subject in hand, I will not review it.

section 4. On mathematics in metaphysics.

In 1763, Kant published Versuch, den Begriff der negativen Grösze in die Weltweisheit einzuführen (Endeavor to introduce the concept of negative quantities into metaphysics) (41). It is an essay on the possible role of mathe-

matics in metaphysics. Kant says that the imitation of the method of mathematics (especially that of geometry) in metaphysics has not produced great results; the exposition **more geometrico** is, in his view, not at all fruitful in natural philosophy. But mathematics (including geometry) may yet be of use, for it offers useful concepts, as, for example, the division of space, and infinitesimal quantities. Kant, however, proposes to investigate the usefulness of negative quantities. They promise to be useful, for, says Kant, they can help to understand action and reaction (NQ, pp.779-781/A I-VI).

The first part of the treatise deals with the explanation of the concept of negative quantities.

Kant begins by defining opposition:

> "Einander entgegengesetzt ist: wovon eines dasjenige aufhebt, was durch das andre gesetzt ist. Diese Entgegensetzung ist zwiefach; entweder **logisch** durch den Widerspruch, oder **real**, d.i. ohne Widerspruch."
> (NQ, p.783/A3)
>
> (Opposing each other is: that one thing negates, what is posited by the other. This opposition is twofold; either **logical** by virtue of the contradiction, or **real**, that is, without contradiction.)

If a logical contradiction is involved, the negation will result in nothing, Kant says, in a **nihil negativum, irrepraesentabile**; this is the case, for instance, with a body which at the same time moves and does not move.

If, however, a logical contradiction is not involved, the negation will result in something (**repraesentabile**). In this real opposition, the predicates do not contradict each other:

> "[...] zwei Prädikate eines Dinges entgegengesetzt sein,
> aber nicht durch den Satz des Widerspruchs."
> (NQ, p.783/A3-4)
>
> ([...] two predicates of one thing are opposed to each other, but not by the principle of contradiction.)

An example of a real opposition is that a motive force acts on a body, as well as an equally great other force which is acting in an opposite direction; the result is rest. This result is not nothing, but a mathematical zero, or a **nihil privativum, repraesentabile** (NQ, p.783/A4).

A logical contradiction, or, as Kant also calls it, a logical repugnance, involves two predicates (of one subject) of which one is affirmative (**realitas**) and the other is negative (**negatio**) with respect to the same thing.

A real repugnance involves two predicates which are both affirmative but with respect to different (opposed) things, so that the consequence is annihilation (NQ, p.784/A5-6).

This repugnance can be mathematically expressed with the symbols + and -, says Kant (id., p.784/A6).

The symbol + does not mean in itself ("vor sich allein") an addition, neither does - in itself mean an subtraction; in fact, in itself they mean nothing, they must be combined. In combination, + with - means subtraction, + with + , as well as - with - means addition (id., pp.785-786/A6-9).

A negative quantity, then, is a quantity which is negative with respect to another quantity, because it can only be negative in combination with another quantity (NQ, p.786/A9).

This combination is, therefore, a real opposition, or real repugnance, not a logical repugnance, because it does not involve a logical contradiction (NQ, p.787/A11-12).

Kant remarks that nothing can be in itself a negative quantity. What is termed negative is largely a matter of convention (NQ, p.788/A12-13).

Kant formulates the basic rule of real oppositions as follows:

> "Die Realrepugnanz findet nur statt, in so ferne zwei Dinge als **positive Gründe** eins die Folge des andern aufhebt."
>
> (NQ, p.788/A13)
>
> (The real repugnance occurs only inasfar as with two things being positive grounds one negates the consequence of the other.)

And he explains this by pointing out that, first, the conflicting determinations or predicates must belong to one subject; second, the conflicting determinations must not oppose each other logically (that is, they must not contradict each other), for then they would not meet the first condition (that is, they could not belong to the same subject); third, the one determination can only negate what the other posits (for else they would not oppose each other); and, fourth, they cannot both be negative, for in that case nothing would be posited (and, as a consequence, nothing could be negated) (NQ, p.788-789/A13-15).

This means, says Kant, that a real repugnance can be only of the form A - A = 0. Not A - 0 = A, and not 0 - 0 = 0; for here, nothing is negated nor posited respectively. Neither can it be of the form 0 - A, for in natural philosophy (contrary to mathematics) nothing can be taken away from nothing (42). And, of course, A+A or 0+0 do not qualify, for there is no opposition there (NQ, pp.789-790/A15-16).

The second basic rule of real oppositions is:

> "Allenthalben, wo ein positiver Grund ist und die Folge
> ist gleichwohl Zero, da ist eine Realentgegensetzung, d.i. dieser Grund ist mit einem andern positiven Grunde in Verknüpfung, welcher die Negative des ersteren ist."
> (NQ, p.790/A16)
>
> (Everywhere, where there is a positive ground and yet the consequence is zero, there is a real opposition, that is, this ground is linked with another positive ground which is the negative of the former.)

Kant remarks, further, that real opposition is not a matter of absence (**defectus, absentia**), as in the case of a body in rest on which no force is acting, but a matter of deprivation ("Beraubung", **privatio**) (NQ, pp.790-791/A17-18).

Of the examples which Kant gives in the second part of this treatise, I will reproduce the two most important ones.

Every body resists the motive force of another body by virtue of its impenetrability, that is, by its repulsive force (as Kant already pointed out in MPh); here, attraction and repulsion form a real opposition, and the result is space (which bodies occupy) and motion; repulsion, or impenetrability, is, therefore, negative attraction (NQ, pp.791-792/A19-21).

The second example refers to cases in which it is not always clear whether an opposition is involved, or only the lack of a positive ground. For instance being cold: is it a lack of warmth, or is it the negation of warmth? This leads Kant to the assumption that in nature as a whole there must be an equilibrium, or rather, processes which establish equilibrium. This assumption is elaborated in the last part of the treatise.

In the last part of this treatise, Kant introduces the general basis of the principle of equilibrium of existence:

> "[...] **ein jedes Vergehen ist ein negatives Entstehen**,
>
> d.i. es wird, um etwas Positives was da ist aufzuheben, eben so wohl ein wahrer Realgrund erfordert, als um es hervorzubringen wenn es nicht ist."
> (NQ, p.803/A41)
>
> ([...] **every decay is a negative coming into existence**, that is, to negate something positive which exists requires just as well a truly real ground as does its coming into existence if it does not yet exist.)

Kant explains this as follows. In general, equilibrium

requires that A-A=0. This means that, if +A is given (that is, A exists), -A is required to annihilate it; and, if -A is given (that is, A does not yet exist), +A is required to annihilate it (viz. its non-existence). In mechanics, this means that motion does not disappear unless it is negated by an opposing force, and that, likewise, rest does not disappear unless it is negated by a motive force (NQ, pp.803-804/A41-43).

Kant distinguishes between two forms of real opposition. The **oppositio realis** is involved when two predicates of one subject negate each other's consequence. An example of this is collision. The **oppositio potentialis**, however, refers to predicates of two different things which do not directly annihilate each others consequence, but are able to do so. An example of this is when two bodies approach each other on a collision-course (NQ, pp.806-807/A48-50).

Subsequently, Kant gives the following general metaphysical rules.

The first rule says:

> "In allen natürlichen Veränderungen der Welt wird die Summe des Positiven, in so ferne sie dadurch geschätzt wird, dasz einstimmige (nicht entgegengesetzte) Positionen addiert und real entgegengesetzte von einander abgezogen werden, weder vermehrt noch vermindert."
>
> (NQ, p.808/A50)
>
> (In all natural changes in the world, the sum of what is positive, inasfar as it is estimated by the addition of concurring (not opposing) positions and the subtraction of really opposing positions, neither increases nor decreases.)

Kant explains that this means that, when A comes into existence in the world, -A must also come into existence in the world, that is, that the coming into existence of one thing implies the decay of another (NQ, p.808/51).

This leads directly to the following rule which says:

> "Alle Realgründe des Universum, wenn man diejenige summiert welche einstimmig sein und die von einander abzieht die einander entgegengesetzt sein, geben ein Fazit, das dem Zero gleich ist."
>
> (NQ, p.811/A56)
>
> (All real grounds of the universe, if one adds those which are concurring and subtracts those which are opposing each other, amount to a sum which is equal to zero.)

Kant points out that this rule in fact proves the existence of God. For, if the sum of all worldly grounds amounts to zero, this means that the world as a whole has as such no ground for its existence; it needs, as a whole, God's assistence. On the other hand, the annihilation of real grounds in the world cannot negate the essence of the world, since grounds are relations and, therefore, exter-

nal to the existence of all things. This means that the sum of the existing things is, with respect to their ultimate ground outside the world (viz. God), positive; yet it is, with respect to the world as such itself, zero (NQ, p.811/A56-57).

Kant adds, in order to avoid misunderstanding, that the rules of equilibrium apply only to the whole of nature. The first rule, for instance, excludes increase or decrease only inasfar as the entire universe is concerned; not inasfar as single motions and collisions are concerned, for then all change would be excluded (NQ, p.812/58-59).

In a last, general, remark, Kant distinguishes between logical ground and real ground.

A logical ground is related with a consequence, or consequences, by the rule of identity (which, in PPCMND, Kant said to be one of the fundamental principles of truth), since in logic the ground contains its consequences. But, says Kant, with a real ground (which refers not to concepts, but to existing things) it is different. It is true that a real ground posits real things, but not by identity (for, in the real world, things do not contain their ground). God, or rather God's will, is the ultimate real ground of the real world, yet the real world as such is not contained in God. God's will is one thing, the real world is quite another ("etwas **ganz anderes**"; NQ, p.817/A68). The same applies to existing things which posit each other; the motion of body A is one thing, that of B quite another thing, yet, if the motion of A is the ground of the motion of B, they posit each other.

> "Ihr möget nun den Begriff vom göttlichen Wollen zergliedern so viel euch beliebt, so werdet ihr niemals eine existierende Welt darin antreffen, als wenn sie darin enthalten und um der Identität willen dadurch gesetzt sei, und so in den übrigen Fällen."
> (NQ, p.818/A69)
>
> (Now, you may divide the concept of divine will as much as you like, you will never find an existing world in it as if it were contained in it and posited by virtue of the identity by it, and it is the same in the other instances.)

This means, of course, that, as Kant points out, in his system a real ground is never a logical ground; this concurs with his distinction between real and logical opposition.

It also means that there is, in his ontological system, no concept which conceives the unity of real things in the world. Kant admits this. He says that, considering the negation of one motion by another, that is, considering real opposition, the only thing which can be said about it is that this negation does not happen according to the principle of logical contradiction. The only way to express it is by stating that

> "[...] darum weil etwas ist etwas anders aufgehoben

werde
[...]."
(NQ, p.819/A71)

([...] because something exists, another thing is negated [...].)

Analyzing real grounds, therefore, one can finally arrive at a fundamental level, but at this level one is confronted with single grounds the relations of which to each other cannot be made clear, Kant concludes (NQ, p.819/A71-72).

In 1764, Kant published another essay on the role of mathematics in metaphysics, Untersuchung über die Deutlichkeit der Grundsätze der natürlichen Theologie und der Moral (Inquiry into the clarity of the principles of natural theology and of ethics) (43).

Referring to the last remark made in NQ, it is interesting to observe what Kant says about the method of metaphysics in UDG. Metaphysics, says Kant, has (contrary to mathematics) many concepts which are not analyzible, that is, by analysis reducible to one or very little basic concepts in which they are contained. One has, therefore to start with concepts which are immediately clear or certain and use them as a basis inasfar as they are presupposed by other concepts (UDG, pp.748-755/A75-82).

As an example of this, Kant repeats his ideas on corporeal substances (as he expounded them in MPh), beginning with the concepts of body, and the divisibility of bodies. Next comes space, etc.

This is of interest inasfar as it confirms that Kant thinks of space as absolute space, but not as the first or basic concept in metaphysics.

Kant also repeats that bodies, inasfar as their existence as such is concerned, do not occupy absolute space, since space is an external phenomenon, established by the relations between bodies, which are also external. He emphasizes that the multitude of external relations does not imply that the constitutive elements of a body are internally divided in many parts (UDG, p.758/A84). The concept of space is also the reason why **actio in distans** is a reasonable concept; space is established by two forces, repulsion and attraction; there is, therefore, no reason to assume that activity could only take the form of one of them, that is, repulsion (force by contact, that is, by occupying space or impenetrability); since space is relatedness, and since space, obviously, has two determining forces, there are two kinds of relatedness: by contact and **in distans** (id., pp.758-759/A84-85).

As concerns the concept of space, Kant's ideas apparently did not change much in the years he wrote the treatises reviewed above. In 1770, however, the year he published De mundi sensibilis atque intelligibilis forma et principiis (On the sensible and intelligible forms and principles of the world), his position is already changing (44). In 1766, in Träume eines Geistersehers (Dreams of a spirit-

seer), he still maintained his pre-critical views (45); and in 1768, in Von dem ersten Grunde des Unterschiedes der Gegenden im Raume (On the first ground of the distinction between regions in space), he did the same, although he points out, here, that space has a proper reality ("eigene Realität") which is independent from the existence of matter (46).

It seems, therefore, that between 1768 and 1770 Kant began to change his metaphysical ideas.

In NQ, Kant's system begins to show its historical (47) character; of course, in ANTH this character is already clear, but only at a physical level - in NQ Kant introduces at last the necessary metaphysical concepts which are implied by his historical view of the universe. These concepts are the concepts related with real opposition and real ground or real determination, expressed in the principle that every decay is a negative coming into existence. Real grounds, according to Kant, are not identical with their consequences (as logical grounds are), but non-identical. This is intelligible, since Kant says that one thing needs, in order to exist, the negation of another, viz. the thing which is its ground.

section 5. Conclusions.

It is clear, I think, that in PPCMND Kant expounds the ontological structure which he presupposed in ANTH, which was published the same year. This structure is also consistent with what Kant said in WSdLK.

First there is the distinction between internal and external state of a substance. The internal state of a substance is the substance inasfar as it is in itself, that is, disregarding its possible relations, since a substance cannot determine another substance by its internal state, but only by being connected to the other substance, which connection, as Kant rejects physical influx, is not a connection between internal states, but an external connection only. The external state of a substance, then, is its relatedness to other substances, therefore its situation, location, and motion in space.

The internal state refers only to existence as such, which is singular.

The external state refers to determination, which involves the connection to other substances. This determination is action and reaction which appear (externally, as phenomena) as motion, that is, as change of spatial location. In fact, action and reaction establish space, since they express the mutual respectivity of substances. Spatial location, therefore, is this respectivity expressed in a single substance; and motion is nothing but a series of spatial locations.

Gravity is a form of activity which is connected with the external phenomenon called motion, inasfar as this external phenomenon is motion by which substances come closer to each other.

The law of conservation of motion, which states that

the total amount of motion can neither increase nor decrease in this world in a natural way, refers only to the external state of substances, since motion is an external phenomenon. God's conserving activity is, therefore, an external activity to the substances inasfar as conservation refers to relatedness, but an internal activity inasfar as it affects the internal state of the substances.

The preservation of their internal states would refer to their existence as such, since internal state refers only to a single substance; Kant expresses this preservation as the conservation of the total quantity of absolute reality.

This preservation of internal state may, as a concept, refer to what Kant previously called living force.

In WSdLK Kant claimed that living force, which is responsible for the continuation of the state of motion a body is in, had to have its ground in the body itself (see chapter 5, section 1). But he also claimed that living force is contingent, since it depends on the relatedness with other bodies. The second claim is consistent with the ontological statements Kant makes in PPCMND; the first seems to be inconsistent with this, since Kant states that no substance can have its ground in itself, except God.

It is, I think, an inconsistency which can partly be explained. One should, in Kant's system, maintain the statement that no substance has its ground in itself, therefore that living force has its ultimate ground not in the body itself. But, as Kant pointed out, living force cannot have its ground in another substance (since then it would be dead force; see chapter 5, section 1). God conserves motion, therefore living force must have its ultimate ground in God. But in the world, living force must have a substrate; this can be nothing else but the single substances. Therefore, living force has its worldly ground in the single substance itself.

This might explain why Kant stated that living force has its ground in a substance itself, but it does not explain away the problem connected with this, viz. that force refers to motion, that is, to external phenomena, whilst force seems to be an internal property or quality. In fact, one has to reject that force is an inner quality of substances; according to Kant, the inner state of a substance only refers to the existence of a single substance, not, therefore, to other substances or to its external state. Force, then, must be an external property which has its ground (in this world) in the substance as a single substance, that is, in the internal state of the substance. But this involves, in Kant's system, a logical contradiction, viz. that internal and external are connected. For something can only be a ground of another thing, if the two things are connected, according to Kant. But if internal and external state were connected, the internal state of a substance would be related to its external state which is related to other substances, which means that the internal state would be an external state.

This leads to the question, why Kant states that the internal state refers only to the single existence of a

substance and, as a consequence, does not include the relations with other substances. It seems a strange statement, for it entails that the existence as such of single substances excludes a relation with other things, therefore a ground, and therefore their being determined; or, in other words, that the existence as such of a single substance is an undetermined existence. But only God's existence is undetermined, since it is its own ground. And if the existence as such of a substance is undetermined, how can it be the existence of a single substance (since single implies, by negation, a multitude; therefore, being the existence of this single substance needs a determination)?

This question makes clear that the concept of internal state apparently includes contradictory determinations, viz. the single and the universal form of existence. The single form: the existence of this one substance. The universal form: existence as such, that is, undetermined existence, that is, God's form of existence. But Kant does not explain this in PPCMND; his ultimate explanation is found in DBBG.

The logical structure Kant introduces in PPCMND is the following.

The most important logical structure is, I think, the structure of determination, viz. to posit a predicate with the exclusion of its opposite, and the concept of ground (**ratio**), which is related to it. This structure establishes the strict distinction between the indeterminate existence of God and the determinate existence of wordly substances (see above). It establishes that in Kant's system determination of substances is an external relation, since nothing (except God) has its ground in itself. The externality of determination entails the rejection of **influxus physicus**. It also entails, therefore, the introduction of the harmony and connectedness which are established in God, not in the world. And it entails what Kant calls the mutual dependency of substances, since substances must determine each other, that is, act and react, because they are connected in God. The Kantian concept of determination, then, determines his system of metaphysics.

The logical basis of the concept of determination is formed by the two twofold principles, viz. the principle of identity and the principle of contradiction. These two principles establish an ontological concept of identity which excludes every form of distinction (non-identity) in it, and, as a consequence, which introduces the absolute distinction between identities. Everything which is, is; which is not, is not; these two parts of the principle of identity form the basis of the concept of logical opposition. The principle of contradiction subsequently forbids that opposing predicates are united in one subject at one time. Consequently, to determine is to posit a predicate and at the same time to negate its opposite. To determine, therefore, is to establish an absolute distinction or differentiation.

Moreover, the absolute distinction and identity are basically related to existence. There is, ontologically, a

difference between **esse** ("Sein", to be) and **existere** ("Dasein", to exist); the former does not necessarily include determination, the latter does. In Kant's ontological system, only existence is considered. This means, given the kind of determination which Kant established, that in his system all forms of being are necessarily singular, for they are forms of existence and therefore differentiated absolutely. It is very typical of Kant's system that 'ordinary' determination does not apply to God, that is, not to the universal form of existence (which, in Kant's system, would be a contradiction in terms, because existence can only be singular). Unity, as concerns existence, is actually absent in the world.

The same logical structure determines the distinction between internal and external state of a substance. The internal state only refers to existence as such, that is, to singularity. The external state, however, refers to relations between singular beings; since singular beings cannot essentially be related, because they are essentially singular, relatedness can only be an inessential and external phenomenon. Therefore, external and internal state are absolutely different.

Kant's 'atomism' is obvious. He thinks of the universe as, basically, empty space with monads in it which compose bodies.
But this is the physical level of the universe, the phenomenal level. On the metaphysical level, referring to the internal state of the monad, atomism appears in the form of absolutely solitary existence, independent of space (which is established by external relatedness). With Kant, empty space, therefore, is not existing absolutely, although it is, on the physical level, absolute space. Space as such is completely void of substantiality, since substantiality refers to existence and existence does not as such enter the physical world. Space, being the strictly external relatedness of monads, is, therefore, independent of simple substances as such, just as the existence of simple substances as such is completely independent of space; space is, as a consequence, absolute on the external level, existence is absolute on the internal level.

Kant's strict separation of internal and external (and, accordingly, of metaphysical and physical, as well as, on the same ground, of singleness and relatedness) makes the mediation between internal and external (and, accordingly, metaphysical and physical, as well as, on the same ground, of singleness and relatedness) virtually impossible. In MPh there is very little said about the unity of the universe; in fact, it is only hinted at in the statement of the presence of God (which I quoted above). The general problem of the ultimate unity of the universe appears in specific problems as, for instance, the problem of how internal force can be externally active (or the reverse) as is implied in, for example, the elasticity of the monads. It also appears in how Kant deals with attraction and repulsion; in ANTH he claimed and partly explained that these forces established the unity of the universe, that is, at least of the physical universe, but in MPh

even this kind of unity is not dealt with. Clearly, Kant has to come up with some kind of solution, and he does so in BDDG.

In this treatise, Kant explains how, in his system of nature, the unity (or harmony) of the universe must be thought.

It is perfectly clear that this unity, or harmony, exists absolutely, preceding everything else, since it is laid down in the possibility of the existing world (see chapter 6, section 3).

The unity, therefore, exists in God, but in a rather undeveloped way. In God, there is only so much present as to establish the possibility of the universe and as is logically possible. God's content, which is the content of the first principle of all things, is the data (or material) from which everything else comes forth; it is a minimal quantity with certain qualities, as is clear from the concept of real contingency, which states that what can be negated without negating the possibility of everything else is contingent in reality, implying that what is really absolute is that without which nothing can exist, that is, that which is the minimal condition for total existence, which is God. God cannot contain everything which exists, since this would imply that he contained many contradictory predicates (as, for instance, all future things contradict all present things as concerns their existence; that is, in general, making external things internal is making real oppositions into logical contradictions); according to the concept of logical contingency, a predicate is not allowed to contradict its subject, and this must also apply to God.

In this minimum of content (or material), unity exists, for Kant says that unity (or harmony) precedes God's choice. It exists, therefore, before all existing things which in reality form one whole exist; as a consequence, the unity is not yet developed, not yet mediated by the different parts of matter that must be united.

This unity (or harmony) is, inasfar as it concerns inorganic matter, the system of the natural laws of motion; Kant makes this clear in the second part of the treatise, where he gives the example of the harmony of the atmosphere, etc.

Here, again, it is clear that there must be a difference of degree of development between primary causes and consequences which act as secondary causes. For Kant says that one can investigate and describe the different forms and charecteristics of motion (thereby, it seems to be implied, finding the general laws of motion), but as concerns the primary cause, viz. gravitation (and, probably, also repulsive force), one has to admit that it cannot be explained. Indeed, it should not be explained, as it is a fundamental force of matter, Kant says. I take it that this means that fundamental forces, which are the minimal condition for motion in matter, exist absolutely necessarily; that is, they belong to the harmony in God. And Kant has already said (see section 1) that what exists absolutely necessarily, exists not by virtue of a determi-

ned ground, therefore it exists in God, and of this it only can be said that it exists. No explanation of this kind of existence can be given, since there is no determined ground to refer to.

In short, therefore, God contains the minimum of reality which is necessary to make everything possible (and in this respect, the minimum of reality is the maximum of reality), and from this, as a single ultimate ground, flow many consequences (that is, secondary and, therefore, determined grounds, mediating the ground which God is) according to the rules of harmony which lay undeveloped in this minimum but become developed together with the coming into existence of reality outside God.

It is clear that Kant's system of metaphysics is consistent with his physics inasfar as his physics is expounded in ANTH, and also with his physical concept of motion and space. It is not consistent with his concept of living force, unless living force is a concept of the kind of internal forces as elasticity and inertia; but then there would be a fundamental problem in his system as a whole, viz. as concerns the relation between internal and external state of a material element (or monad).

Force in general is, according to Kant, an external relation, establishing space. He also explains how force establishes space, viz. as repulsion (or impenetrability) and attraction (or gravity).

Space is the unity of the universe, but only externally so. It is the totality of external relations, that is, of real determinations. Real determinations imply non-identity (in contrast to logical determinations). The existing universe may be a unity, but it is a unity of separated single entities. Not even the relations between these entities can negate their separation; they actually imply this separation. The ultimate ground of universal unity is God.

Kant introduces specific logical structures to make his system of nature consistent.

In the subsequent chapter, I will examine how Kant's ontology and logic as expounded in the texts reviewed above fit together in one system of nature which underlies his historical physical theory expounded in ANTH.